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Health Care Delivery System Changes: A Special Challenge for Teaching Hospitals

C. Thomas Smith

Abstract—Changes in the method of financing health care in the United States in order to gain better control over escalating costs are receiving considerable attention. If major changes are made in the system, the nation's teaching hospitals are particularly vulnerable and must be given special consideration. The attributes of teaching hospitals and the special role which they play in the health care delivery system are delineated. Since responsiveness to system changes by teaching hospitals is key to their survival, several short-term and long-term strategies are identified. Teaching hospitals will need to be as innovative in their management and organizational approaches as they are clinically.

For over a quarter of a century, from the early 1950s to the late 1970s, American hospitals experienced enormous growth and enjoyed the opportunity and privilege of almost unlimited access to resources in developing new and expanded services for their communities. However, the combination of an industry which consumes more than 10 percent of the gross national product (GNP) and an economy which forces governments at all levels and businesses to scrutinize all expenditures has resulted in a public clamor for changes in health care delivery that may be unprecedented.

A review of the major forces which created this circumstance shows that many of the goals established for health care over the years were achieved. However, due to a slower growing economy and to competition for government support for other programs, the successes of the health care delivery programs are now exacting too high a price. The natural reaction is to assign blame, to call carelessly for change, and to want all of the same services for less cost. All participants in health care delivery must be careful to assess the factors which created the current environment and to avoid tossing aside ingredients which are essential to continued achievement of society's health service goals. Similarly, it is important to understand that while certain efficiencies may be achieved, it is unlikely that any new arrangements will allow doing everything with less resources.

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Federal Policy Role

There were several major public policy initiatives which helped create the successes and problems regarding health care delivery. Starr (1) carefully documented the variety of federal programs which were developed over the past three decades for socially desirable purposes. All

were aimed at increasing the nation's knowledge in medicine and assuring that everyone had access to health care services. As a result, federal policies created the current environment.

In the 1950s the federal government began a massive investment in biomedical research via the National Institutes of Health, a commitment which has yielded impressive dividends. Federal policy was also promulgated to assure local access to health service by building hospitals throughout the country with construction financing provided through the federal Hill-Burton program. With more hospitals providing more services to more people, health insurance coverage was expanded by employers as standard fringe benefits.

The 1960s witnessed some payback from the research investment. New technology began to foster development of new health care services. A desire to assure the broadest possible dissemination of the new knowledge and technology regarding medicine led to the federally financed regional medical program, which assisted hospitals in gaining access to the latest technology. Additional service capacity generated needs for more health manpower to deliver these services, and again the federal government financed more and larger schools for producing physicians, nurses, and other health professionals. The growing health care system also highlighted the inability of the elderly and poor to secure services on an equal footing with other segments of society, and so Medicare and Medicaid were created by Congress to improve access to health services for this portion of the population.

In the 1970s emphasis was placed on enhancing the health care system's performance, with key objectives being accessibility, continuity, and comprehensiveness. "Health care as a right" became a rallying cry of many of those demanding access to services for all citizens. Governments accepted an obligation to deliver on this proclaimed "right" and thus became increasingly involved not only in financing but also in planning health services. Public efforts to control the health system included approval of capital expenditures and major program changes by federally created comprehensive health planning agencies.

In summary, the federal government sponsored expansion of medical knowledge, technology, institutions, services, manpower, and finances and assumed responsibility for assuring accessibility to all segments of society. Thus, it is not surprising that the share of the GNP consumed by health services has tripled in the last half century. Public policy initiatives created programs and provided the financing which produced this outcome. Hospitals and medical schools were developed to provide access to the latest health care technology and to prepare future health manpower. There seems to be general agreement by both critical observers and the public that superior quality health services are available in this country. In fact, so many benefits were derived from research and technological development that there is now broad concern about problems created by the extension of life.

Contributing to this scenario has been the nation's system of financing health care delivery. The nonprofit hospitals have functioned as quasi-tax authorities with income redistribution capacity. For example, the perennial underfunding of government-sponsored patients, even after Medicare and Medicaid payments, has forced hospitals to levy a "tax" on nongovernment patients to make up for the government's reimbursement "short-

fall." Similarly, the traditional method of funding medical and nursing training has been to add the cost of these educational programs to the cost of care for patients in those hospitals with education as part of their mission.

The federal government's changes in the method of paying for Medicare hospital services are anticipated to have a profound effect upon the ability of nonprofit hospitals to continue these income redistribution practices. Especially vulnerable are those large urban hospitals which serve low-income populations and which operate significant teaching programs. An examination of this group of important institutions is instructive in understanding the dilemma society faces in balancing the need to restrain cost growth with the imperatives of equitable access for all citizens and training of health care manpower.

Teaching Hospital Characteristics

While many hospitals are teaching hospitals, the discussion here will focus on the members of the Association of American Medical Colleges (AAMC) Council of Teaching Hospitals (COTH), since data are readily available for this group. COTH members offer substantial postgraduate physician training programs in the major disciplines and are affiliated with a medical school. Selected statistics (Table 1) reveal the following important facts:

1. Since COTH members are generally larger than most hospitals, they represent only 5.5 percent of the nation's hospitals but 18.7 percent of the beds.

2. COTH hospitals generally have patients who are sicker and have more complex requirements; therefore, these hospitals' admissions (17.5 percent of the nation's patients) account for 20.1 percent of the total patient days.

3. Large outpatient programs are operated at teaching hospitals, accounting for nearly one-third of all hospital-based clinic visits.

4. Although COTH hospitals admit less than one-fifth of hospitalized patients, they train nearly three-fourths of all residents.

5. Because of the complexity of care they provide and their large clinics, COTH members receive over one-fourth of all revenue while accounting for one-fifth of the patient days.

6. The locations and types of patients served result in COTH hospitals carrying more than a third of all bad debts and providing nearly one-half of all hospital charity care.

The AAMC Department of Teaching Hospitals has identified a number of common characteristics of teaching hospitals that make it reasonable to generalize about them (2). A profound influence on these institutions is their commitment to multiple institutional objectives. The operation of these institutions would be far simpler if they would limit their goals. Clearly, having fewer goals is a distinct advantage of the investor-owned hospitals. However, teaching hospitals typically proclaim, to varying degrees, their commitment (*a*) to provide a complete range of high quality services, (*b*) to operate approved educational programs for physicians and other health professionals, (*c*) to provide a setting for the conduct of medical research, and (*d*) to offer a host of community service activities to enhance the quality of life in their community.

Although all hospitals are complex organizations, teaching hospitals have more special interest groups which believe they each deserve some measure of control over certain aspects of the operation. This fact is reflected in the numerous internal

TABLE 1

Comparison of Council of Teaching Hospitals (COTH) with All U.S. Short-Term Hospitals, 1979–80

Indicator	Total Hospitals	COTH Hospitals	Percent of COTH Hospitals
No. of hospitals	5,984	329	5.5
No. of beds	999,627	186,670	18.7
No. of admissions	36,700,000	6,400,000	17.5
No. of patient days	277,000,000	55,500,000	20.1
No. of outpatient visits	127,000,000	38,500,000	30.3
No. of residents	56,350	40,775	72.4
Net patient revenue	$73,800,000,000	$18,900,000,000	25.7
Bad debts	$ 3,300,000,000	$ 1,200,000,000	35.4
Charity care expenditures	$ 1,300,000,000	$ 600,000,000	47.2

Sources: American Hospital Association surveys (2, 3).

and external controls or influences, beyond patients, which are an important part of teaching hospitals' operations. Internally, trustees, medical department chiefs, nurses, unions, medical staff members, medical school deans, and university officers all have important interests which must be acknowledged. Externally, accreditation and review bodies, regulatory and licensure agencies, major buyers of care, including governments and business, and grantors exert significant influence on the organization.

While medical staff matters are always delicate to deal with, the teaching environment and the departmentalized structure complicate this area. Sensitive relationships include those between full-time and part-time faculty members (the traditional "town-gown" arena), between chiefs and members of their departments, and between attending physicians and house staff members. In addition, teaching hospital staffs are usually two or three times larger than nonteaching hospital medical staffs. Questions of university versus hospital allegiance and goals also complicate the situation.

The pursuit of innovation adds another important dimension for teaching hospitals. The commitment to advancing understanding often requires the early implementation of new technology. This entails risk-taking and demands access to significant amounts of capital for its support. It may also generate conflict with regulators, who may have a different view of the relevance of this objective to the agency's mission of holding down costs. It may also generate goal conflict among the hospitals' organizational components as they compete for scarce resources.

Multiple missions imply multiple sources of finance. In some tax-supported teaching hospitals, funds are made available by governmental appropriation to finance some of these diverse activities. Private teaching hospitals, however, typically finance these programs with higher patient charges and inadequate philanthropy. Grants support research in both public and private hospitals. A consistent factor in all teaching hospitals is higher operating costs than in nonteaching hospitals. The Department of Teaching Hospitals reported that the average total expenses per adjusted admission in 1980 was 38 to 50 percent greater in COTH member hospitals than in non-COTH hospitals (3). The Yale-New Haven Hospital conducted a study of primary university-affiliated hospitals in 1979 and found that the expenses of this group were 37 percent higher per diem and 51 percent higher

per adjusted admission than hospitals with limited affiliations; this reflected a longer length of stay.

Several factors account for these operating cost differences (2). The direct cost of operating graduate medical education programs typically amounts to about 4 percent of the operating expense. This includes the salaries and benefits of house staff members and those who are paid to supervise the program. Little evidence is available of the indirect cost due to inefficiencies resulting from training or to the unnecessary expenses incurred by inexperienced practitioners. There are offsetting savings from having available highly skilled and relatively inexpensive talent to handle care problems that might have to be covered in a more expensive way (4). In general, up to 6 percent or more of operating expense is typically committed to education.

Diagnostic case mix also contributes to higher costs. Teaching hospitals provide backup and specialized support for community hospitals. This is done through skilled specialists, whose practice is limited to narrow areas and enables the institution to offer tertiary care services. The breadth of the service attracts patients whose needs are unusual and whose care may demand more resources.

The stated mission of many teaching hospitals is to provide care to anyone who needs it. Their typical location in urban environments results in a disproportionately large volume of patients who have little or no resources to pay for care. Teaching hospitals provide 52 percent more of their revenue to support bad debts and charity than the average hospital (9.4 percent of their revenue for COTH hospitals compared with 6.2 percent for all hospitals) (3).

The teaching hospital's mission, location, and type of patient served require large ambulatory service programs. In addition, the growth of medical school faculties, whose practice is often based in the teaching hospital, adds to the need for large ambulatory services. Unfortunately, the inefficiencies of the teaching setting and the overhead allocation rules of cost reimbursers result in a cost per unit of ambulatory service that often greatly exceeds payment levels.

The diagnosis-related group, fixed-price payment program for Medicare is now a reality for hospitals. Whether or not adequate provision is made for the higher costs of teaching hospitals will depend upon individual institutional practices. A teaching allowance is included in the reimbursement formula and, in the short run, could be the difference between financial solvency and bankruptcy of some teaching hospitals. However, even if the allowance is adequate at the outset, understandable suspicion looms that it will be eroded over time, as were other provisions in past Medicare regulations. The prudent teaching hospital will begin planning now to supplement or replace funding support for its programs or see them abandoned due to inadequate resources.

Growth of Medical Schools

Enormous changes have occurred in U.S. medical schools, according to data compiled by the AAMC. Between 1959 and 1982, the federal commitment increased the number of schools by 48 percent (from 85 to 126), the number of students by 124 percent (from 29,614 to 66,485), and the number of residents by 208 percent (from 15,417 to 47,449). With increased federal support for more schools, more students, and more research, the increase in faculty members associated with these changes was 419 percent (from 10,350 to 53,748).

Table 2 displays shifts in the financing sources of medical schools. These changes will likely produce different results from those of the past two decades.

1. Total federal support has declined from 44.4 percent to 27.7 percent of total revenue.

2. Although state and local government support has increased slightly, total government support from all levels has dropped from 63.3 percent to 50.1 percent of total revenue.

3. Tuition and fees remain a minor source but have increased 54 percent in the proportion of income they provide.

4. Medical service revenue, or patient service fees, has increased 143 percent in proportion of total revenue. This area is receiving increased attention from faculties as a major source of flexible funds. Faculty practice growth presents a potential area of conflict between a faculty and its university, the faculty and the hospital, and the faculty and community-based physicians.

Discussion

What are the implications and how does the nonprofit teaching hospital cope with all the changes? Are there any steps other than trying, to the best of an institution's ability, to live within the resources and constraints which the environment presents? One strategy is characterized by the phrases "circling the wagons," "hunkering-down," "making-do," and "living within our means." This manner of coping seems predicated on the notion that the problem is temporary and will go away with time. While most things change given enough time, the circumstances now in motion will take a considerable time to play out and will fundamentally alter the structure of the health delivery industry.

If the teaching hospital wishes to preserve its multiple missions, it will have to devise multiple financing sources to underwrite them. Buyers of health services are moving to payment only for services received, not for subsidization of care for the poor, education programs, or other socially worthwhile purposes. Teaching hospitals are especially vulnerable to these changes and thus have a major incentive to be as innovative in their organization and management as they are in the development of new medical services.

The multi-institutional development that has characterized the hospital industry for the last few years has not yet involved many major teaching hospitals. The complexity of these organizations perhaps accounts for slower movement into multi-institutional relationships. However, teaching hospitals will have to

TABLE 2

Trends in Sources of Revenue of U.S. Medical Schools
(Dollars in Millions)

Source	1970–71		1981–82	
	Amount	Percent	Amount	Percent
Federal research	438	25.6	1,578	21.9
Other federal	322	18.8	415	5.8
State and local governments	323	18.9	1,617	22.4
Tuition and fees	63	3.7	413	5.7
Medical service	209	12.2	2,140	29.7
Other income	358	20.9	1,054	14.6
Total	1,713	100.0	7,217	100.0

Source: "U.S. Medical School Finances," unpublished report, Association of American Medical Colleges, 1983.

consider carefully new patterns of functioning in order to preserve the objectives which guide the enterprise. Some teaching hospitals may be able to survive independently, but most probably cannot. Whereas in the past, teaching hospitals were the larger institutions and able to garner resources sufficient to maintain a technological advantage, now multi-institutional groupings make large freestanding hospitals small by comparison. This may shift the resource advantages of size to the multi-institutional institutions and make the higher-priced, freestanding institutions even more vulnerable.

Control over operations has always been important in teaching hospitals. However, trustees will have to balance their desire for control versus their commitment to community service as expressed in institutional goals. If the goals can be met and society served, it should be less important where control resides.

Perhaps in the self-proclaimed role as guardians of the community's health, fulfilling a quasi-governmental function, teaching hospitals have assumed that they are best able to make decisions as to how a community expends its health care dollars. They were allowed to function relatively freely in the past, but concern about costs is changing the locus for decision-making away from providers. Buyers of care are now exerting control over decisions. The burden is to assure that the consequences of decisions are fully understood, including any untoward impact on a segment of patients or upon manpower training programs. This requires that teaching hospital leaders understand their role as advocates for those least able to speak up for their needs.

The missions of teaching hospitals proclaim a commitment to everyone's needs but the price of carrying out the commitment may become too high. The past income redistribution practices will not be available in a fixed price environment, especially if this method is adopted by all payers. Furthermore, with the demise of cost-based payment, hospitals will no longer be paid for what they do. Now hospitals must learn to do that for which they get paid. The distinction between these patterns is significant and far-reaching. If those who buy hospital services are willing to pay only for the services provided and nothing else—including subsidizing care of the poor or manpower training—then hospitals will either comply with such strictures or go out of business. Perhaps some hospitals or programs should close. However, the poor are likely to be the ones most affected by such terminations, as others can seek service elsewhere. Therefore, the only responsible option is to devise ways to reduce costs to levels which buyers are willing to pay.

In the short run, hospitals will react in several ways:

1. Product-line evaluations will result in the termination of programs which are not financially viable. The poor are especially vulnerable to such changes, as are weak training programs. The closure of high-cost, low-usage services will result in the shifting of patients who require specialized care, which will be available at fewer institutions. This could assist teaching hospitals by increasing their volume of tertiary services, provided that payment rates are sufficient.

2. Some shifting of patients may occur as health care providers seek to minimize their free care and bad debts. While hospitals and nonhospital providers may compete for remunerative ambulatory services, there is little competition to serve those with few or no resources. Means need to be developed to share this community responsibility, or teaching institutions will eventually collapse from

the unevenly distributed burden. Physicians, particularly those in community practices, should consider the long-term consequences of this pattern and their responsibilities to share some of the load with their teaching hospital colleagues.

3. Health services to the poor will be scaled down to essential services. Basic care will be provided without amenities which may be considered desirable but not critical. This will have an impact on training programs.

4. More careful financial screening will occur to assure that those receiving subsidized services are those who most need them. Patients eligible for governmental support will be required to show evidence of approval for care prior to receiving service.

5. Emergency care will continue to be provided by hospitals, but nonemergency care will be limited or deferred.

The longer view is always cloudier. However, a number of forces already in motion suggest probable nationwide trends that will ultimately affect all hospitals:

1. Prudent buyer efforts by government and business will force institutions to pare costs to levels purchasers are willing to pay. Hospitals will seek government-financed patients, even at reduced payment levels, to the extent that marginal costs are covered.

2. Multi-institutional development will enable vertically integrated providers to contract directly (perhaps via capitation) with buyers for a full range of services. Incentives will be developed to contain buyer expense and to place risk on providers as well as on patients.

3. Supported services will be limited to those deemed essential or with a demonstrable payoff. This will include funding for so-called "wellness" or prevention programs.

4. Hospitals will aggregate resources among themselves and with other providers to gain resource advantage of size, to spread risk, to share expertise, and to enhance competitive positions. Teaching hospitals will become associated with multi-institutional systems.

Despite the goals and hopes, two-tier care was never eliminated. In fact, there are several tiers, and, in health as in other areas, personal resources determine each person's location. Perhaps limited resources make the "equal access, equal care" goal unattainable. Even if equal care is not achievable, just as there is not equality in education, nutrition, housing, or other important areas, there must be no retreat on the goal of equal access. Hospitals have long been the guardian of the disadvantaged, never doubting people's right to be served. What is at issue is how the financial burden will be handled.

Environmental forces demand that teaching hospitals focus on their essential purposes and seek alternative sources of support for programs in social welfare and medical education. In order to survive and thrive, these institutions will have to exchange some degree of control for new opportunities for growth. Failure to respond will erode the viability of the nation's teaching hospitals.

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Impact of Board Certification On Physician Practice Characteristics

Edmund R. Becker, Ph.D., Steven Culler, Ph.D., and Robert Ohsfeldt, Ph.D.

Abstract—In the study reported here, the authors, using data from two American Medical Association surveys, examine the impact of board certification on selected physician practice characteristics. The results indicate that board certification is more prevalent for certain specialties, ages, types of practice, and locations of practice. Board certification has a substantial impact on the gross income of most major specialties, but these differences decline significantly for net incomes. Finally, comparisons of the hours worked per week and weeks worked per year show only small differences between board-certified and nonboard-certified physicians.

An important aspect of the physician's career, the decision to obtain specialty board certification, is voluntary and does not appear to provide physicians with additional legal privileges in the practice of medicine. Moreover physicians are not required to limit themselves to the practice specialty in which they are certified. The certification boards are in no sense educational institutions, and the certificate of a board is not to be considered a degree (1). In short, board certification does not confer on any person legal qualifications or privileges, nor does it in any way interfere with or limit the professional activities of a licensed physician. To become board-certified in a specialty, a physician needs to complete the required graduate training and pass the board-certification examination.

In spite of the fact that board certification does not enhance a physician's legal qualifications, there are several reasons why a physician may be willing to fulfill the requirement to become board-certified. One major reason is that board certification may improve the possibilities for him to acquire admitting privileges to the hospitals of his choice. In addition, he may use board certification to help gain referrals. Finally, the board-certified physician is usually viewed by patients as having successfully completed certain additional requirements beyond those required for license.

In 1981 over 53 percent of all active physicians in the United States were board-certified (Table 1). This percentage had grown steadily since 1971, when only 36.7 percent of all active physicians were board-certified. Moreover, during the 1970s and early 1980s, board certification

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TABLE 1

Total Number of Physicians in the United States, the Number and Percentage of Those Board-Certified, and Annual Growth Rates for All Physicians and Board-Certified Physicians, 1971–1981

Year	Board-Certified Physicians	Total Physicians*	Percentage Board-Certified	Annual Growth Rate	
				Board-Certified Physicians	Total Physicians
1971	118,493	323,136	36.7	—	—
1972	125,787	325,710	38.6	6.2	0.8
1973	133,776	330,469	40.5	6.4	1.5
1974	139,707	336,774	41.5	4.4	1.9
1975	154,218	347,677	44.4	10.4	3.2
1976	157,444	356,283	44.2	2.1	2.5
1977	180,998	371,936	48.7	15.0	4.4
1978	194,566	384,615	50.6	7.5	3.4
1979	206,702	403,337	51.2	6.2	4.9
1980	224,394	425,716	52.7	8.6	5.5
1981	235,148	441,614	53.2	4.8	3.7

* Excludes physicians who were inactive and unclassified, whose addresses were unknown, and who were not involved in patient care.

Source: American Medical Association Physician Masterfile.

increased at an average annual rate of 7.2 percent. This means that the annual growth rate of board-certified physicians exceeded the annual growth rate for all active physicians by 4 percentage points. Nevertheless, despite this widespread growth in board certification, there have been few comprehensive investigations to examine the association between board certification and characteristics of the physician's practice (2–4).

The authors in this paper, using the most recent data available from two American Medical Association data sets, address the following questions concerning the relationship between board certifications and characteristics of physicians' practices. How does the distribution of board-certified physicians vary by specialty, sex, and age? How are board-certified physicians distributed among various practice arrangements and practice locations? How does board certification affect a physician's gross and net income and the number of hours he works?

Data Sources

The data used in the study to examine the income, hours, and weeks worked are from the annual core survey of the Socioeconomic Monitoring System (SMS) conducted in the second quarter of 1982 by the Center for Health Policy Research of the American Medical Association (AMA). This survey is part of a quarterly survey developed to collect data on physicians' practice characteristics, professional incomes and expenses, and fees. The survey is a random sample of active, office-based physicians in direct patient care-related activities who are not employed by the federal government. The sample used in the present study had 3,817 physicians. A detailed discussion of the survey methodology and sample characteristics has been presented by Henderson and White (5).

Data for the other variables, sex, age, type of practice, specialty, and practice location, were taken from the American Medical Association's 1981 Physician Masterfile, the most recent masterfile

available. The masterfile contains information on every known physician in the United States, including ones who are not members of the AMA. To make this data source comparable with SMS data, only active, nonfederal, patient care physicians, excluding interns and residents, were included in the study.

Physician Distribution

Table 2 shows the number of nonfederal, patient care (NFPC) physicians and the percentage board-certified, by four specialty groupings, sex, and age. A much higher percentage of NFPC physicians were board-certified (62.2 percent) than total (federal and nonfederal) patient care physicians (53.2 percent) reported in Table 1.

The highest percentage of NFPC board-certified physicians was in the surgical specialties (74.3 percent). In contrast, only 39.9 percent of NFPC general practitioners were board-certified. The high percentage of board-certified physicians in the medical and surgical specialties probably reflects the importance of board certification in gaining hospital admitting privileges for these specialties. The lower percentage of board-certified physicians in general and family practice was probably due to the relatively recent development (in 1969) of a board-certification program in family practice. It might be expected with the passage of time that the low certification rate in this field will disappear.

More NFPC male physicians than NFPC female physicians were board-certified, 63.7 percent versus 46.7 percent, respectively (Table 2). Possible reasons for this were the relatively recent influx

TABLE 2

Number of Nonfederal, Patient Care Physicians and Percentage of Board-Certified Physicians by Specialty, Sex, and Age, 1981

Nonfederal Patient Care Physician	Number of Physicians*	Number Board-Certified	Percentage Board-Certified
Specialty			
General and family practice	51,000	20,350	39.9
Medical specialties	87,619	57,147	65.2
Surgical specialties	88,578	65,771	74.3
Other specialties	83,132	49,653	59.7
Sex			
Female	28,776	13,447	46.7
Male	281,553	179,474	63.7
Age			
<30	10,634	2,853	26.8
30–35	44,707	26,864	60.1
35–40	50,385	36,875	73.2
40–45	43,498	32,160	73.9
45–50	38,571	26,721	69.3
50–55	35,327	22,762	64.4
55–60	32,147	19,138	59.5
60–65	23,909	12,806	53.6
>65	31,151	12,742	40.9
Total	310,329	192,921	62.2

* Excludes physicians who were inactive and unclassified and whose addresses were unknown.

Source: American Medical Association Physician Masterfile.

of women into the medical profession and the fact that females have historically spent fewer years in residency training than their male counterparts.

The highest percentages of board-certified NFPC physicians were in the 35-to-40 and 40-to-45 age ranges, at 73.2 and 73.9 percent, respectively (Table 2). After the 40-to-45 age category, the percentages declined until the over 65 age category, in which only 40.9 percent of the physicians were board-certified. One likely reason that a low percentage of older physicians was board-certified is the recent growth in the number of specialties in which physicians can become board-certified.

Board-certified NFPC physicians dominated every type of practice arrangement in all the specialty groupings except solo practice and nongroup arrangements among general practitioners (Table 3). Of all the NFPC general practitioners located in solo practice, a vast majority were not board-certified. In the other three specialty groupings (for example, NFPC surgical specialists in group practice), the number of board-certified physicians exceeded nonboard-certified physicians by over five times. Clearly in most types of practice other than solo, it appears that physicians were more often than not board-certified.

For general family practitioners, the percentage of nonboard-certified physicians was larger than that of board-certified physicians in communities of every size (Table 3). Moreover, these differences grew larger when comparing physicians in Standard Metropolitan Statistical Areas (SMSA) with those physicians who were not located in SMSAs. (SMSAs must include one city with 50,000 or more inhabitants or two adjacent cities with a combined population of 50,000 or more.) That is, the relative difference in the number of board-certified and nonboard-certified physicians was larger in the SMSA communities than in those communities that were not SMSAs.

In the other three specialty groupings, only in the two nonmetropolitan community areas of less than 25,000 population did nonboard-certified physicians exceed the percentage of board-certified physicians (Table 3). For these three specialties, communities with more than 25,000 population all had greater percentages of physicians who were board-certified. This suggests that even though recent evidence has documented the growing movement of board-certified physicians to smaller and smaller communities (6, 7), in certain specialties (general/family practice) and certain communities (less than 25,000 population), the number of nonboard-certified physicians still exceeds the number of board-certified physicians. It should be reemphasized that this finding covers all active, nonfederal patient care physicians in the United States.

Incomes and Work Schedules

Board-certified physicians had higher gross incomes than their nonboard-certified counterparts (Table 4). With the exception of those in the medical specialties, all the differences were statistically significant. For physicians in the medical specialties, the difference in gross annual income was only $18,234 a year between board-certified and nonboard-certified physicians, while for physicians in surgical specialties the difference in gross income was $103,401.

There was a similar pattern of differences in net incomes (incomes after expenses but before taxes) for board-certified and nonboard-certified physicians (Table 4). Board-certified physicians across all specialties had higher net in-

TABLE 3

Percentage of Nonfederal, Board-Certified and Nonboard-Certified Physicians by Type and Location of Practice and by Specialty, 1981

Physicians' Practice and Location	General/Family Practice		Medical Specialties		Surgical Specialties		Other Specialties	
	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified
Type of practice								
Solo	43.7	18.3	18.7	27.1	13.4	35.7	18.1	21.6
Partnership	6.0	7.4	3.6	12.5	2.7	16.7	3.4	9.3
Nongroup*	2.2	1.8	1.3	3.1	0.7	2.7	3.4	4.0
Group practice	7.7	12.3	5.9	22.2	3.7	20.9	8.9	23.4
Other†	0.2	0.6	0.9	4.8	0.4	3.1	1.7	6.3
Location								
Nonmetropolitan								
Less than 10,000	1.7	1.0	0.1	0.1	0.1	0.1	0.2	0.1
10,000–25,000	5.0	4.1	0.6	0.7	0.7	1.0	0.8	0.6
25,000–50,000	5.1	4.3	1.2	2.0	1.5	3.1	1.6	1.9
Greater than 50,000	4.9	3.9	1.8	3.6	1.8	5.2	2.3	3.3
Potential SMSA‡	0.9	0.6	0.4	0.9	0.4	1.3	0.6	0.8
SMSA								
50,000–500,000	11.0	8.6	5.5	12.3	4.6	15.7	7.2	11.4
500,000–1,000,000	6.5	4.2	4.8	9.1	3.4	10.5	5.1	8.0
1,000,000–5,000,000	17.6	10.2	13.8	26.3	9.4	27.8	15.8	24.4
Greater than 5,000,000	7.4	3.0	6.6	10.3	3.9	9.4	6.6	9.2

* Nongroup refers to physicians in practice arrangements with other physicians but not formally organized in a group practice.

† "Other" includes practices in corporations, voluntary organizations, and medical societies.

‡ SMSA = Standard Metropolitan Statistical Area. Potential SMSA is an area that is a future candidate for SMSA status.

Source: American Medical Association Physician Masterfile.

comes than nonboard-certified physicians. However, only for the surgical specialties and "other" specialties were these differences significant. The discrepancy in net incomes between board-certified and nonboard-certified physicians was substantially less than the difference in gross income. For medical specialists, board certification meant only an additional $6,968 to net income, while for surgical specialists the added net income was $44,110. Since the difference between gross and net income is expenses, these differences show that some of the impact of board certification on gross income apparently is dissipated by expenses.

Only one significant difference was disclosed in hours worked per week between board-certified and nonboard-certified physicians (Table 4). Board-certified general practitioners worked, on the average, 2.6 hours more per week than nonboard-certified general practitioners. For all other specialty categories, the differences in hours per week were smaller and insignificant.

A similar picture emerged in comparisons of the weeks worked between board-certified and nonboard-certified physicians (Table 4). Only the "other" specialties category showed a statistically significant difference between board-certified and nonboard-certified physicians in the number of weeks per year worked, 46.5 versus 47.0, respectively. Of course, this difference is only half a week. For the other specialty categories, these differences were even less.

TABLE 4

Income and Working Time of Nonfederal, Board-Certified and Nonboard-Certified Physicians, by Specialty Groups, 1981

Physician Data	General/Family Practice		Medical Specialties		Surgical Specialties		Other Specialties		Total	
	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified	Nonboard-Certified	Board-Certified
Income										
Gross	148,534*	215,476	161,321	179,555	141,270*	244,671	123,170*	195,204	141,832*	209,928
Net	70,982	78,250	77,200	84,168	84,378*	128,488	78,840*	104,197	77,334*	104,051
Working Time										
Hours per week	55.8*	58.4	58.4	57.6	55.5	57.0	54.1	54.3	55.8	56.5
Weeks per year	47.5	47.9	47.4	47.1	47.0	47.2	47.0*	46.5	47.3	47.0

* Differences between nonboard-certified and board-certified physicians are statistically significant at the $p = .10$ level.
Source: American Medical Association Socioeconomic Monitoring System.

Conclusion

Board certification among U.S. physicians, in spite of its voluntary nature, has been increasing rapidly. Between 1971 and 1981, the annual growth rate in physicians obtaining board certification was 7.2 percent, while the annual increase in

all physicians was only 3.2 percent. By the end of 1981, 53.2 percent of all U.S. physicians were board-certified, representing an increase of 16.5 percentage points over the percentage of physicians board-certified in 1971. An examination of nonfederal, patient care physicians shows that in 1981 a total of 62.2 percent were board-certified. If the growth rate of the 1970s and early 1980s continues through the 1980s, trend analysis shows that by the end of this decade nearly 70.4 percent of all physicians will be board-certified and that by the turn of the century nearly 90 percent will be.

The present investigation shows, however, that board certification is not uniform across the medical profession. Surgical and medical specialists (74.3 percent and 65.2 percent, respectively) were the most likely to be board-certified, while general practitioners were the least likely to be (39.9 percent). Male physicians had a much higher rate of board certification than female physicians (63.7 percent versus 46.7 percent). Physicians between the ages of 40 and 45 had the highest rate of board certification (73.9 percent), and before and after that age category the percent board-certified declined.

Board-certified physicians in all major specialties categories dominated each type of practice arrangement that was analyzed except for solo practice and nongroup arrangements, where nonboard-certified general practitioners were in the majority. Similarly, nonboard-certified general practitioners were in the majority in each analyzed size of communities, while board-certified physicians in the other three major specialty groupings dominated almost every practice location with the exception of communities with less than 10,000 population. These patterns of diffusion of board-certified physicians indicate that in 1981 board-certified, nonfederal, patient care physicians permeated nearly all types of practice and all practice locations.

Past evidence has suggested that there are significant differences in incomes and work patterns among board-certified and nonboard-certified physicians. While the results of the present study confirm these differences in incomes and work patterns, they reveal that these differences vary widely among major specialties. For example, net and gross incomes were significantly different for board-certified and nonboard-certified physicians in the surgical and "other" specialties but not for those in medical specialties. Overall, the number of hours worked per week or the number of weeks worked per year are not significantly different for the sampled board-certified and nonboard-certified physicians.

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Dentistry in Medical Education: Results of a Comprehensive Survey

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Abstract—A survey of all U.S. and Canadian medical schools was undertaken to assess the current extent and nature of instruction in dental topics for medical students. The perceived importance of including such instruction in the undergraduate medical curriculum was ascertained, and barriers to teaching dental topics to medical students were identified.

In recent years medical education has emphasized treatment of the entire patient, as evidenced by the upsurge in primary care postgraduate programs. Even so, topics pertaining to dentistry and oral medicine are frequently neglected in these programs as well as in the general education of undergraduate medical students. The Department of Dentistry of Bowman Gray School of Medicine of Wake Forest University is currently introducing pertinent dental topics into the existing undergraduate curriculum. As a prelude to its curriculum proposal, the Department of Dentistry surveyed all U.S. and Canadian medical schools to assess the current extent and nature of instruction in dental topics for medical students. Information obtained from the survey was needed (*a*) to help guide and justify the local curriculum proposal, (*b*) to stimulate interest on a national level in medical institutions which currently provide little or no instruction on dental topics, and (*c*) to establish a data base for research into the effect of teaching such dental concepts to medical students.

Fifteen years ago Drinnan reported a similar but less detailed survey. His findings indicated that few institutions made a concerted effort to provide instruction in dental topics, yet the consensus response was that this area deserved more curriculum time (1). Since the mid-1970s, several articles and editorials have described the efforts of individual medical schools to teach dental topics to undergraduate students (2–8). Others have written on the similarity between medicine and dentistry and their need for mutual exchange (9–12).

Method

A two-page questionnaire was mailed at the beginning of academic year 1982–83 to the Group on Medical Education (GME) "correspondents" in all medical schools in the U.S. and Canada. (GME

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correspondents are individuals designated by the deans of medical schools to receive mailings from the Group on Medical Education of the Association of American Medical Colleges.) A cover letter accompanying each questionnaire explained the purpose of the survey and asked the correspondent to forward the questionnaire for completion, if necessary, to an appropriate person. Six weeks after the original mailing, a follow-up letter was mailed to all nonrespondents with another copy of the questionnaire.

The survey was structured to obtain information in seven areas: (*a*) what types of structured, formal associations with the dental profession existed in medical schools; (*b*) how important was the teaching of dental topics perceived to be; (*c*) when were dental topics taught during the four-year curriculum; (*d*) who taught dental topics in medical schools; (*e*) how many hours were being allotted to teaching dental topics and how many hours should be allotted; (*f*) which dental topics were being taught and which ones should be taught; and (*g*) what barriers were preventing or hindering the teaching of dental topics. This multicomponent approach also supplied a means to check the internal validity of the responses to the questionnaire. Additional comments were invited, and respondents were given an opportunity to request survey results. The raw data were compiled, encoded, and subjected to computer analysis.

Results

Of the 140 questionnaires sent, 127 (91 percent) were returned. Twelve were rejected as too incomplete for meaningful interpretation. The remaining 115 (82 percent) were acceptable for analysis. Eleven of the respondents were dentists.

Dentistry was integrated into medical school settings in a number of ways. The respondents reported a formal association of their medical school with a dental school in 46 cases (40 percent). Dental school faculty members were cross-appointed to the medical school faculty at 42 institutions (37 percent). Dentists were appointed to the faculty of 71 medical schools (62 percent). Only 14 medical schools (12 percent) reported having a department of dentistry in their organizational structure. Dentists on the faculties of medical schools were usually appointed to various departments other than dental departments: 38 (33 percent) in surgery, 2 (2 percent) in family medicine, 2 (2 percent) in medicine, 12 (10 percent) in pathology, or 20 (17 percent) in other departments. Of the medical schools reporting, 84 (73 percent) had a hospital dental service in their affiliated teaching hospitals, and 90 (78 percent) had dentists appointed to the staff at those hospitals.

The most common association of dentists with medical schools was through teaching hospital staff appointments and hospital dental services. The least common was a separate department of dentistry. In many institutions, more than one type of association exists. When the medical school maintained a relationship with a dental school, a dental department in the school, or dentists on the faculty, the authors defined such arrangements as an academically oriented association. Associations through hospital dental services or dentists with hospital staff appointments at affiliated teaching hospitals were defined as service-oriented.

Teaching dental topics in the undergraduate medical curriculum was perceived as important by 99 (86 percent) of the respondents. However, only 35 (30 percent) felt that the number of hours currently devoted to teaching such topics was adequate. Respondents at medical

schools with dental departments unanimously agreed that teaching dental topics was important; perhaps because of high expectations, they less often considered the number of hours allotted to teaching dental topics as being adequate. Lectures on dental topics presented as components of other courses were reported in 75 (65 percent) of the medical schools, but only 6 (5 percent) had a formal or structured course on dentistry. Opportunities for clinical rotations in a dental facility were available in 35 (30 percent) of the responding schools. The greatest barrier to teaching dental topics was lack of curriculum time, as reported by 85 institutions (74 percent). Table 1 relates the amount of lecture and clinical instruction on dental topics included in the undergraduate medical curriculum to various organizational arrangements with the dental profession.

Table 2 shows the estimated number of hours allotted for dental topics and the number that the respondents felt should be allotted.

Schools with dental departments provided more time to the teaching of dental topics than schools without dental departments, according to the respondents. It was surmised that the large number of nonrespondents in each category resulted from the difficulty in assessing hours allotted when dental topics were covered in several different courses.

Table 3 provides responses to a comprehensive list of dental topics included on the questionnaire. Dental and oral anatomy were included in the curricula of 64 percent of the schools responding. Craniofacial growth and development and oral manifestations of systemic diseases were the only other topics taught by more than 50 percent of the responding institutions. Instruction on dental caries and periodontal diseases was reported by 22 percent of the respondents. Comparison of "taught" and "should be taught" responses indicates that respondents believed more instruction should be given in every topic.

Discussion

The results of the survey reported here provided significant insight into the current status of teaching dental topics to medical students in U.S. and Canadian medical schools. Individual responses ranged from no association with the dental profession, no dental topics taught, and no perceived need for dental instruction to dental departments fully inte-

TABLE 1

Percentage of Survey Respondents from 115 U.S. and Canadian Medical Schools Reporting Inclusion of Dental Topics in Undergraduate Medical Curriculum, 1982–83

Structure	Lectures				Clinical Teaching			
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Medical/dental schools formally associated	50	43	11	4	0	2	28	15
Dental department in medical school	43	43	14	14	0	14	43	43
Dentists on faculty	51	51	15	7	1	4	34	34
Dental service in teaching hospital	48	44	15	9	1	2	32	26
Dentists appointed to teaching hospital staff	47	43	13	8	1	3	30	27
Overall	44	45	14	7	2	4	29	26

TABLE 2

Percentage of Survey Respondents from 115 U.S. and Canadian Medical Schools Reporting Number of Hours Allotted and Hours That Should Be Allotted to Teaching Dental Topics in Undergraduate Medical Curriculum, 1982–83

Structure	Allotted Hours					Hours That Should Be Allotted				
	0	1–6	7–15	>15	No Response	0	1–6	7–15	>15	No Response
Medical/dental schools formally associated	13	22	15	6	43	0	15	15	4	65
Dental department in medical school	7	7	21	14	50	0	0	7	29	64
Dentists on faculty	7	28	23	7	35	0	7	18	13	62
Dental service in teaching hospital	11	30	20	6	33	1	12	20	11	58
Dentists appointed to teaching hospital staff	11	29	19	6	36	1	10	19	9	61
Overall	11	29	20	4	35	1	9	18	8	63

grated into the hierarchy of the medical school with greater than 15 hours of dental teaching provided. Although only 11 of the 115 respondents were dentists, a vast majority (86 percent) indicated that teaching dental topics was important. The percentage of institutions which provided lectures of dental topics as components of other courses (65 percent) closely related to the percentage of those teaching dental and oral anatomy (64 percent). No other topic was presented by more than 42 percent of the schools responding aside from dental and oral anatomy; craniofacial, oral, and dental growth and development; and oral manifestations of systemic diseases. Fewer than 25 percent of the responding institutions provided instruction on dental caries and periodontal diseases—two of the most common health afflictions found worldwide. Overall, very little instructional time is devoted to dental topics which have clinical applicability to the practicing physician.

The overwhelming barrier to teaching dental topics was perceived to be the lack of curriculum time. This is a barrier which must be addressed whenever any new material is introduced into an existing curriculum. The knowledge base for medicine is so rapidly expanding that time limitations pose major problems for all medical educators. Lack of faculty resources, identified as a barrier in approximately 25 percent of the responses, was not perceived to be a barrier by any of the medical schools which had dental departments and was a barrier in only 10 to 12 percent of the schools with an academically oriented association with the dental profession. A review of the responses relating to time allotted to teaching dental topics, what dental topics are taught, and availability of clinical rotations shows that there was a greater likelihood of teaching dental topics if a department of dentistry existed within the medical school. However, departments of dentistry were present in only 12 percent of the institutions responding. Still, approximately 75 percent of all medical schools did have some affiliation with dentists through a hospital dental service in their teaching hospitals or through the appointment of dentists to the staff of teaching hospitals. Teaching of dental topics occurred more readily when the relationship between the medical school and the dental profession was academically oriented (medical and dental schools formally as-

TABLE 3

Percentage of Survey Respondents from 115 U.S. and Canadian Medical Schools Reporting Dental Topics Taught and Topics That Should Be Taught in Undergraduate Medical Curriculum, 1982–83

Dental Topics	Taught	Should Be Taught
Dental nomenclature	23	44
Dental and oral anatomy	64	75
Craniofacial, oral, and dental growth and development	52	63
Dental occlusion	5	16
Etiology, prevention, treatment of dental malocclusion	6	27
Etiology, prevention, treatment of dental caries	22	47
Use of fluoride	29	49
Etiology, prevention, treatment of periodontal diseases	22	45
Dental infections	26	46
Oral manifestations of systemic diseases	56	70
Orofacial pain	40	57
Detection and team management of oral cancer	42	58
Dental and maxillofacial trauma	34	52
Oral and maxillofacial surgery	30	41
Dental restorations and prosthetics (such as fillings, crowns, and dentures)	3	13
Other	1	6

sociated, a dental department in the medical school, or dentists on the medical school faculty) rather than service-oriented (teaching hospitals with a hospital dental service or dentists on the hospital staff). Therefore, it appears that for dental topics to receive adequate attention in the undergraduate medical curriculum, an academically oriented dental environment is desirable.

Comprehensive instruction in dental topics to the undergraduate medical student does not take place in a majority of U.S. and Canadian medical schools, and, based on the survey responses, this appears to be a shortcoming in medical education. Although the number of hours needed to teach pertinent dental topics seems to be a small component of the overall four-year curriculum, curriculum time is at a premium.

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DATAGRAM

Inflation and Medical School Faculty Salaries

During the decade from 1973 to 1983, persistent inflation was a troublesome fact of life for medical schools and their faculties as well as for others. In this datagram, a 10-year span of faculty salary data is examined in order to determine how well medical school faculty salaries have kept pace with inflation. The data are derived from the annual series, *Report on Medical School Faculty Salaries*, of the Association of American Medical Colleges and from reports on the consumer price index published by the U.S. Bureau of Labor Statistics.

Annual mean compensation data for basic and clinical science faculty members are presented in Figure 1. During the 10-year period beginning in 1973, the unadjusted mean compensation increased by 93 percent for basic science faculty members and by 118 percent for clinical faculty members. After adjusting for inflation, however, real purchasing power declined by 14 percent and 3 percent, respectively. By way of comparison, the average constant weekly earnings of private nonagricultural workers declined by 13 percent over the same time period.

For basic science faculty members, purchasing power reached its nadir in 1981; for clinical faculty members, the low point was 1980. Both groups have recovered some real income in recent years. Clinical faculty members have access to earnings from their medical practice in addition to other university resources, and this may account for their less acute loss of purchasing power.

With respect to academic rank and constant dollar purchasing power (Figure 2), full professors fared best with a 14 percent decline for

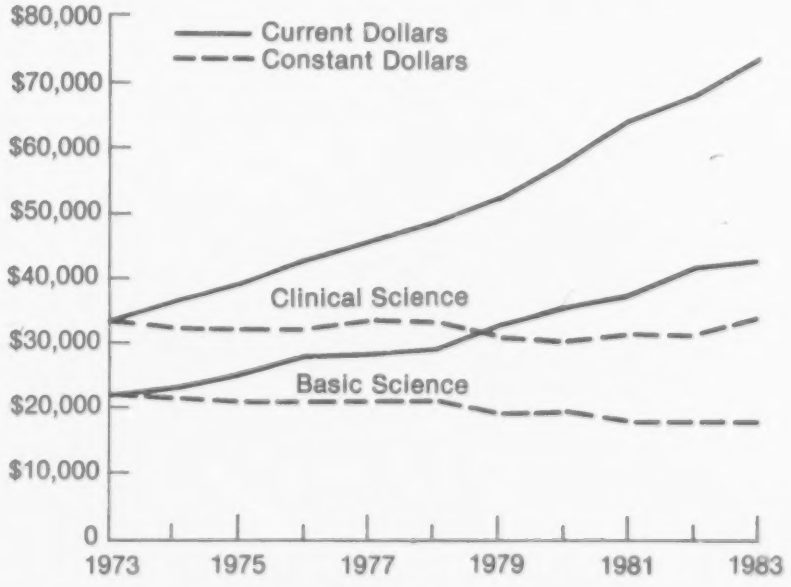

FIGURE 1
Annual mean salary for basic and clinical science faculty members in current (1983) dollars and constant (1973) dollars.

TABLE 1

Comparison of U.S. Medical School Faculty Annual Compensation, 1973–1983

Year	Consumer Price Index	Basic Science Faculty				Clinical Science Faculty			
		Mean Salary		Equivalent Required To Maintain 1973 Purchasing Power	Cumulative Decrease in Real Purchasing Power (percent)	Mean Salary		Equivalent Required To Maintain 1973 Purchasing Power	Cumulative Decrease in Real Purchasing Power (percent)
		Current	Constant			Current	Constant		
1973	100.0	$22,000	$22,000	$22,000	—	$33,600	$33,600	$33,600	—
1974	111.0	23,200	20,900	24,400	5.0	36,300	32,700	37,300	2.7
1975	121.1	25,000	20,600	26,600	6.4	39,400	32,500	40,700	3.3
1976	128.1	26,600	20,800	28,200	5.5	42,200	32,900	43,000	2.1
1977	136.4	28,000	20,500	30,000	6.8	44,900	32,900	45,800	2.1
1978	146.8	29,900	20,400	32,300	7.3	48,400	33,000	49,300	1.8
1979	163.3	32,000	19,600	35,900	10.9	52,000	31,800	54,900	5.4
1980	185.4	35,000	18,900	40,800	14.1	57,100	30,800	62,300	8.3
1981	204.6	37,700	18,400	45,000	16.4	63,700	31,100	68,700	7.4
1982	216.8	40,300	18,600	47,700	15.5	68,700	31,700	72,800	5.7
1983	223.4	42,400	19,000	49,100	13.6	73,100	32,700	75,100	2.7

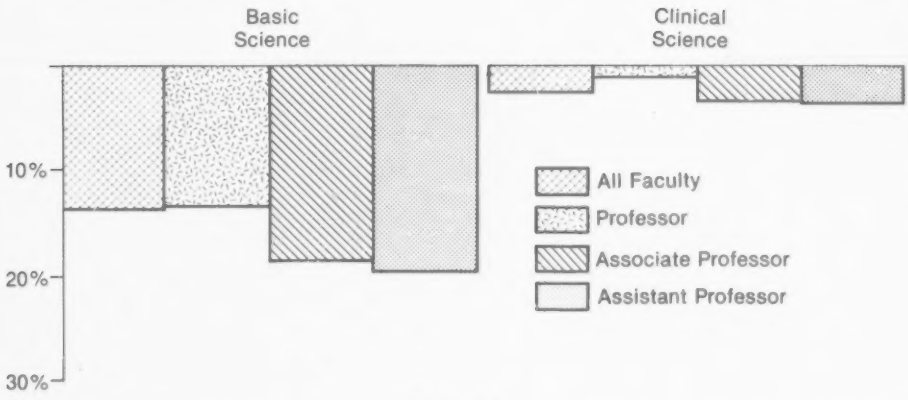

FIGURE 2
Cumulative decrease in real purchasing power, basic and clinical science faculty members, 1973–1983 (chairmen not included).

basic science professors and a 1 percent decline for clinical science professors. Assistant professors fared least well with respective constant declines of 20 percent and 4 percent. The cumulative decrease in real purchasing power of all basic science faculty members is not as unfavorable as one would expect from a quick review of the data for each of the three ranks, since there was a change in the distribution by rank during the period studied. In 1973, 29 percent of the faculty members were at the full professor rank, while in 1983 that fraction had climbed to 35 percent. For faculty members in the clinical departments, the corresponding percentages were 26 and 28 for 1973 and 1983, respectively.

In order to purchase in 1983 goods and services equivalent to those purchased in 1973, basic science faculty members would have had to earn a mean total compensation of $49,100 a year; likewise, clinical faculty members would have had to earn $75,100 (Table 1). Reflecting the decline in real purchasing power, the actual mean compensations were $42,400 and $73,100, respectively, for the two groups of faculty members.

These data indicate the relative worth of faculty positions in the aggregate over time and do not measure the income of individual faculty members. A newly hired assistant professor had more purchasing power in 1973 than a newly hired assistant professor in 1983, but the data do not show the effects of promotions or merit raises as they apply to individual faculty members. Because of this, one cannot conclude that individual faculty members have lost purchasing power during the last decade.

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